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lected and a large number of photographs, sketches and ethnographical notes have been brought home.

Almost all the tribes along and between the Ogowé and Congo have been brought under the influence of France, including, to some extent, the cannibal Fahuins.

Mr. Grenfell has made another exploring voyage devoted to the Lulongo and the Boruki, the only rivers of importance that remained unexplored between the Kasai and the Lomame. The Lulongo falls into the Congo in  $18^{\circ} 42'$  E. long. and  $0^{\circ} 41'$  N. lat. Mr. Grenfell ascended it to  $22^{\circ} 32'$  E. long. and  $10'$  N. lat.; it therefore runs nearly parallel to the main stream. The Boruki is formed by the union of three rivers, one of which, the Juapa, was ascended as far as  $23^{\circ} 14'$  E. long. and  $1^{\circ} 1'$  S. lat., where it was still an open water-way one hundred yards wide and twelve feet deep.

AMERICA.—*American News*.—Explorations conducted in the Gran Chaco by M. de Brettes have resulted in the discovery of a large salt lake, situated between lat.  $25^{\circ} 57' .06''$  S. and lat.  $27^{\circ} 30' 18''$  S. Three rivers, flowing north and south, probably tributaries of the Vermejo, were discovered. The natives, Chunupis, Velolas and Matacos, are degraded, cruel and hypocritical. The country is flat, covered with thorny trees, marshes and tall, sharp prairie grass.—Dr. Ten Kate has explored the canal connecting the Surinam and Saramacca rivers, ascended the Wayombo, the banks of which are inhabited by the Arrowaks, proceeded for five days up the Nikerie, which flows through a well-wooded but uninhabited region, and returned down the Nikerie and up the Corentin to Oneala.—M. Thouar, according to the *Brazil and River Plate Mail*, has returned successfully from his second journey up the Pilcomayo, and has proved the river to be navigable.

EUROPE.—*European News*.—The German Statistical Bureau gives the population of Berlin in 1885 as 1,316,382. In 1880 Germany had only eight towns of more than 100,000 inhabitants, now it has fourteen.—The Dobruja has an area of about 5766 square miles, about two-thirds of which is productive, the rest marshes and sand with lakes. The official estimates place the population at 150,000.

#### GEOLOGY AND PALÆONTOLOGY.

THE LONG-SPINED THEROMORPHA OF THE PERMIAN EPOCH.—I have at various times described the extraordinary development of neural spines of the dorsal vertebræ in the genus *Dimetrodon*, which belongs to the *Clepsydropidæ*, one of the carnivorous families of the saurian order Theromorpha. The dentition of these animals is of the most formidable character, consisting of compressed, finely serrate teeth on the maxillary and dentary bones mingled with huge conic tusks on the middle of the maxillary,

anterior end of the dentary, and occupying the entire alveolar face of the premaxillary. The huge neural spines formed an elevated fin on the back. In a medium-sized specimen of *Dimetrodon incisivus*, where the vertebral body is 35<sup>mm</sup> in length, the elevation of the spines is 900<sup>mm</sup> or twenty and a half times as great. The apex of the spine in this species is slender and apparently was flexible. The utility is difficult to imagine. Unless the animal had aquatic habits and swam on its back, the crest or fin must have been in the way of active movements. Accordingly the spines are occasionally found distorted at the union of surfaces of fractures. The limbs are not long enough nor the claws acute enough to demonstrate arboreal habits, as in the existing genus *Basiliscus*, where a similar crest exists. A very peculiar species has been described under the name of *Naosaurus claviger* Cope. There the spines are not quite so elevated as in the *D. incisivus*, but they are more robust, and have transverse processes or branches which resemble the yardarms of a ship's mast. In a full-sized individual, the longest cross-arms, which are the lowest in position, have an expanse of 260<sup>mm</sup>, or ten and a quarter inches, while the spine has about the height of 500<sup>mm</sup> (19.75 inches), the body being 60<sup>mm</sup> long. The animal must have presented an extraordinary appearance. Perhaps its dorsal armature resembled the branches of shrubs then, as they do now, and served to conceal them in a brushy or wooded region. Or, more probably, the yardarms were connected by membrane with the neural spine or mast, thus serving the animal as a sail with which he navigated the waters of the Permian lakes. A very singular character of the spines in all the species is that they are hollow, as in *Cœlacanth* fishes, and that the central cavity is not closed at the apex.

There is a well-preserved cranium of the *D. claviger*, but the muzzle is unfortunately wanting. The median line rises forward so that the convexity of the top of the muzzle is higher than the posterior parts of the skull, whose profile descends rapidly. This throws the orbit far back and gives the animal a peculiar appearance.

*Naosaurus* differs from *Dimetrodon* in the transverse processes of the neural spines of the vertebræ. There are three species, which differ as follows :

- Spines of vertebræ cylindrical distally; transverse processes replaced above by tuberosities.....*N. cruciger*.  
 Spines of vertebræ expanded and compressed above.  
     Palatine teeth large, forming a pavement .....*N. microdus*.<sup>1</sup>  
     Palatine teeth much smaller and more widely spaced.....*N. claviger*.

All these species are from the Permian formation of Texas. Figures of the *N. claviger* will be published in the Transactions of the American Philosophical Society.—*E. D. Cope*.

<sup>1</sup>*Edaphosaurus microdus* Cope, Proceeds. Amer. Philos. Society, 1884, p. 37.

THE REPORT OF THE CONGRESS OF GEOLOGISTS.<sup>1</sup>—This publication includes a report of the proceedings of the congress and reports of the several committees appointed to present systems of nomenclature and cartography by the Congress of Bologna. These reports are highly interesting, and display, in an instructive manner, the points of agreement and divergence between the geologists of the different countries of Europe. The digested result will constitute, when completed, the most valuable synopsis of the subject yet written. Unforeseen circumstances prevented the completion of the reports of some of the American committees, and the United States Geological Survey was not adequately represented, although Mr. McGee did his best with the means at his disposal.

The color system adopted is, as it should be, founded on that which has long been current in all countries. The new system proposed by the U. S. Geological Survey was not adopted, but a letter from Major Powell, recommending it, was read. Some of the details for representing details, proposed by Major Powell, might, we think, be introduced with advantage. The important American formations of the Laramie and Puerco must also be represented by appropriate colors. We hope that the Congress of London will make up for these deficiencies, and add to the good work done by the Congress of Berlin whatever may be necessary from other portions of the earth.

The report is well printed and is, in all respects, what was to have been expected of the distinguished secretary of the American Committee.

FIRST APPEARANCE OF THE GRASSES.—At a meeting of the Geologists' Association, held at London, April 2d, J. Starkie Gardner discussed the points bearing on the geological period at which grasses first commenced to assume a preponderating position in vegetation. Their value and importance at the present day were first sketched, and it was remarked that they occupy under cultivation one-third of the entire area of Europe, inclusive of lakes and mountains, while, exclusive of malt and spirituous drinks distilled from them, their products to the value of nearly one hundred millions sterling are imported annually into this country alone. There are over 3000 species fitted to occupy most diverse stations and to overcome nearly every kind of competition under no matter what conditions, with the result that about ninety-five per cent of the plants growing in ordinary meadowland are grasses. The conclusion arrived at was that there was no great development of grasses until towards the close of the Eocene, no definite remains being associated with any of the older Eocene floras of temperate latitudes. A number of facts

<sup>1</sup> The Work of the International Congress of Geologists of Berlin and of its committees. Published by the American Committee under direction of Dr. Persifor Frazer.

were brought forward to show that grasses could by no possibility have failed to become associated with the remains of other plants in beds deposited under such conditions as those of the Eocene had they existed in any profusion then, while further to support this argument it was stated that the very similar Oligocene and Miocene beds all over Europe are crowded with them. Further, it was shown that the dentition of all the early Eocene herbivorous Mammalia was adopted for crunching fruits, snapping twigs, and grubbing of roots, rather than for browsing on such food as grass, so that the evolution of true Graminivora, as well as the specialized Carnivora that prey on them, must be post-dated to the appearance of the grass itself. The geological history of the whole class of insects was reviewed, with the object of supporting the conclusion arrived at as to the *post* mid-Eocene date of grass. Older remains of grass may, however, occur in the last series of Tertiary deposits in Spitzbergen, but as yet their age has not been accurately correlated. Finally, it was shown that the introduction of an aggressive type in vast numbers and of different habits to pre-existing vegetation, exerted an influence on terrestrial life altogether without parallel, and for the first time rendered possible the development of a meadow and prairie vegetation as distinct from that of marsh, scrub and forest, with all the attendant forms of animal and vegetable life to which such vegetation is indispensable.

GEOLOGICAL NEWS.—*General*.—An orographical and geological map of Turkestan, the work of M. Mouchketoff, has been presented to the Académie des Sciences de Paris, accompanied by a geological description of the Aralo-Caspian steppes.

*Carboniferous*.—M. B. Renault affirms that the reproductive bodies of Calamodendrons are grains of pollen, which occur in groups of four within four sacs carried by the fertile bracts of the fruit, which recalls that of Annularia. These plants must, therefore, according to M. Renault, be regarded as gymnospermous phanerogams.

*Secondary*.—R. F. Tones (*Geol. Mag.*, March, 1886) describes two species of Madreporaria of the genera Thecocyathus and Trococyathus, from the Upper Lias of Gloucestershire.

*Tertiary*.—R. Lydekker has described the palatal half of the cranium of a large Erinaceus from the Upper Miocene of Oeningen. It is closely allied to *E. europæus*, but the describer names it *œningensis*.—The same palæontologist has described the anterior portion of the cranial rostrum of *Melitosaurus champsoides*, a crocodilian from the Miocene of Malta.—Alfred Bell reviews the succession of the later tertiaries in Great Britain in the *Geological Magazine* for February, 1886. He concludes that Britain was never otherwise than continental from the close of the Middle Red Crag to that of the minor glaciation, also that man came into Britain after the glacial epoch,

*Quaternary*.—According to Prof. J. N. Woldrich, seven or eight forms of domestic dogs have existed in Europe from alluvial times until now, while four species of diluvial dogs are known. Existing European dogs are therefore not descended from any species of *Canidæ* now living in Europe, though they may have been crossed with the wolf, fox, or jackal. The so-called feral dogs of Syria may be the remnant of a diluvial true wild dog, the greyhound is said to be certainly descended from a diluvial ancestor of the African *Canis simensis*, and long-eared small dogs may be descended from a diluvial ancestor of the fennec.—Sir R. Owen has described the premaxillary and scalpriform teeth of a large extinct wombat (*Phascolomys curvirostris* Ow.) from the Wellington bone caves. The animal must have been somewhat smaller than the type of the sub-genus *Phascolomys*.

### MINERALOGY AND PETROGRAPHY.<sup>1</sup>

*PETROGRAPHICAL NEWS*.—In a "Preliminary paper on an investigation of the Archæan formations of the Northwestern States,"<sup>2</sup> Professor R. D. Irving mentions the results he has reached in the study of the Archæan formations in the region extending from Lake Huron to Southeastern Dakota. These results, as well as those reached by other investigators, have been incorporated in a map which presents in good form the present views held by the author in regard to the distribution of the rocks of this region. The map is accompanied by a report of the work which has already been done in the various districts and a description of the plans to be followed in the solution of problems which are presented in such great number. These problems are all of the very highest importance to a knowledge of the relations which the older formations bear to each other, and to the explanation of the origin of the crystalline schists. The subject of metamorphism in the Huronian rocks is referred to, and a promise is made that before long some publications in this direction may be expected. A microscopical examination of hornblende rocks, occurring throughout the region, seems to point to the conclusions (1) that many of the non-schistose varieties are really changed augitic eruptives; (2) that some of the hornblende schists were originally also augitic eruptives, while others grade into and are associated with the hornblende gneisses. In these the hornblende appears always to be of a secondary nature, every phase being found between schists in which augite excludes the hornblende to others in which the hornblende excludes augite. (3) The so-called actinolite schists are sometimes only the result of extreme alteration of eruptive green stones. The fact of the

<sup>1</sup> Edited by W. S. BAYLEY, Johns Hopkins University, Baltimore, Md.

<sup>2</sup> Fifth annual report of the Director of the U. S. Geol. Survey. Washington: Government Printing Office, 1885.